EXCHANGE RATE MISALIGNMENT IN DEVELOPING COUNTRIES

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In the past few years exchange rates have attained great prominence in economic and policy discussion in developing countries. For example, it has been argued that the inappropriate exchange rate policies pursued by some countries in the late 1970s contributed to the international debt crisis of the early 1980s. According to the World Bank (1984), overvalued exchange rates in many African countries have resulted in a dramatic deterioration in their agriculture and their external accounts. Others have argued that exchange rate policy triggered the disappointing outcome of the Southern Cone (Argentina, Chile, and Uruguay) economic reforms and free-market policies during the late 1970s.

One important exchange rate issue is whether a country's real exchange rate is out of line with respect to its long-run equilibrium level. There is general agreement that maintaining the real exchange rate at the "wrong" level results in significant welfare costs. It generates incorrect signals to economic agents and results in greater economic instability (Willet 1986). If an exchange rate is indeed misaligned, there are alternative ways of correcting it. This raises the issue of effectiveness of *nominal* devaluations to restore equilibrium in the *real* exchange rate.

The distinction between nominal and real exchange rates has become increasingly important. While the nominal exchange rate is a monetary concept that measures the relative price of two moneys, the real exchange rate measures the relative price of two goods. More specifically, the real exchange rate (RER), is defined as the relative price of tradables with respect to nontradables:[1]

$$\text{RER} = \frac{\text{Price of tradable goods}}{\text{Price of nontradable goods}}. \tag{1}$$

The most important property of the RER is that it is a good proxy of a country's international competitiveness. A decline in the RER, or a *real exchange rate appreciation*, reflects an increase in the domestic cost of producing tradable goods. If there are no changes in relative prices in the rest of the world, this RER decline represents a deterioration of the country's international competitiveness: the country now produces tradable goods in a way that is less efficient than before, relative to the rest of the world. Symmetrically, an increase in the relative price of tradables represents an improvement in international competitiveness.[2]

Changes in competitiveness are sometimes "justified" by real events in the economy, such as technological progress, movements in external terms of trade, changes in taxation, and so on. These justified changes are an equilibrium phenomenon and do not require policy intervention. In some circumstances, however, there are "unjustified" departures of the actual RER from its equilibrium value: a disequilibrium change, which has come to be known as RER *misalignment*. Distinguishing equilibrium movements from misalignments has become one of the greatest challenges for macroeconomic analysts. The sections that follow analyze in detail different aspects of equilibrium and disequilibrium real exchange rates.

Determinants of the Equilibrium Real Exchange Rate

The equilibrium RER is defined as the relative price of tradables to nontradables that results in the simultaneous attainment of equilibrium in the external sector and in the domestic (that is, nontradables) sector of the economy. This means that when the RER is in equilibrium the economy is accumulating (or running down) assets at the "desired" rate and the demand for domestic goods equates its supply.

Although the definition of RER given in equation 1 is analytically useful, it is difficult to calculate in practice. A more operational definition of the real exchange rate is the following:

$$\text{RER} = \frac{EP_T^*}{P_N} \tag{2}$$

where E is the nominal exchange rate defined as units of domestic currency per unit of foreign currency, P_T^* is the world price of tradables, and P_N is the domestic price of nontradables. In measur-

ing equation 2, economists have to define proxies for P_T^* and P_N. These proxies are usually some foreign price level (wholesale price index, for example), and the domestic CPI. Edwards (1988) discusses measurement problems in detail.

The bare bones of this equation can now be fleshed out. The equilibrium RER is that relative price of tradables to nontradables that, for given (equilibrium or sustainable) values of other relevant variables such as trade taxes, international prices, capital and aid flows, and technology, results in the simultaneous attainment of *internal* and *external* equilibrium. Internal equilibrium means that the nontradable goods market clears in the current period and is expected to be in equilibrium in the future.[3] External equilibrium is attained when the sum of the present current account and the expected current account in the future satisfies the intertemporal budget constraint that states that the discounted value of current account balances has to be equal to zero. In other words, external equilibrium means that the current account balances (current and future) are compatible with long-run sustainable capital flows.[4]

Various implications follow from this definition. First, the equilibrium RER is not immutable. When there are changes in any of the other variables that affect the country's internal and external equilibriums, the equilibrium RER will also change. For example, the RER "required" to attain equilibrium will vary according to whether the world price of the country's main export is low or high. It will also be affected by import tariffs, export taxes, real interest rates, capital controls, and so on. These immediate determinants of the equilibrium RER are called *real exchange rate fundamentals*. Second, there is not "one" equilibrium RER, but rather a path of equilibrium RERs through time. Third, the path will be affected not only by the current values of the fundamental determinants, but also by their expected future evolution. If there are possibilities for intertemporal substitution of consumption through foreign borrowing and lending, and in production through investment, expected future events—an expected change in the terms of trade, for example—will affect the current value of the equilibrium RER.

The fundamental determinants of the equilibrium RER are those *real* variables that in addition to the RER, play a large role in determining the country's internal and external equilibrium. The *external RER fundamentals* include: (a) international prices (that is, international terms of trade); (b) international transfers, including foreign aid flows; and (c) world real interest rates. The *domestic RER fundamentals* can be divided into those variables that are policy related and those that are independent of policy decisions. The policy related RER fundamentals include: (a) import tariffs, import quotas, and export taxes; (b) exchange and capital controls; (c) other taxes and subsidies; and (d) the

composition of government expenditure. Among nonpolicy fundamentals, technological progress is the most important.[5]

Changes in taxes or subsidies on trade will have significant effects on the equilibrium RER. For example, a (permanent) import tariff will increase the domestic price of importables, which in turn will reduce demand for importables. The increase in the domestic price of importables will also induce a higher demand for nontradable goods, boosting their prices. Thus, under the most plausible conditions, the import tariff will result in a new equilibrium characterized by a lower price of exportables relative to nontradables and a higher price of importables relative to exportables.[6]

Changes in the international terms of trade will also affect the equilibrium RER. From an analytical perspective a deterioration in the terms of trade and the imposition of a tariff have somewhat similar effects. Both imply a higher domestic price of importables and a lower quantity demanded. However, a worsening in the international terms of trade has a bigger negative income effect than a tariff rise. The empirical evidence suggests that terms of trade deteriorations usually lead to an equilibrium real depreciation (that is, to a higher equilibrium RER; see Edwards, forthcoming).

Capital controls will affect intertemporal consumption and thus the path of equilibrium relative prices and real exchange rates. For example, if they are relaxed to allow an increase in capital inflows and foreign borrowing, the result will be higher current expenditure on all goods, including nontradables. As a result, there will be an increase in the price of nontradables or equilibrium real appreciation.

International transfers are another example of how a fundamental variable affects the equilibrium path of the RER. If a country has to make a transfer to the rest of the world, current and future domestic real income and expenditure will fall, generating a fall in the relative price of nontradables or a real depreciation in the current and future periods. In a way, in order to make a transfer to the rest of the world, the equilibrium RER has to depreciate. This is particularly relevant today: in stark contrast to the 1970s, many developing countries now make significant transfers to the rest of the world.

For those countries receiving foreign aid, the analysis is symmetrical. Aid is a transfer from the rest of the world, and as such it will generate an equilibrium real appreciation. Perhaps paradoxically, it therefore reduces the international competitiveness of the recipient country, making the country's exports less competitive internationally.

The fact that the equilibrium RER moves when its fundamental determinants change has significant consequences for policy. Some policymakers still think that the equilibrium RER is a constant or immutable number. According to this approach, which is derived from the simplest notions of purchasing power parity, any deviation of the

real exchange rate from its value in some past period (usually called "the equilibrium year") represents a disequilibrium and is cause for concern. On the contrary, actual changes in RERs do not necessarily reflect a disequilibrium. They can reflect changes in equilibrium conditions generated by changes in fundamentals.

Macroeconomic Policy and Misalignment

Although the equilibrium RER is a function of real variables only, the actual real exchange rate responds both to real and monetary variables. The existence of an equilibrium value of the real exchange rate does not mean that the actual real rate has to be *permanently* equal to this equilibrium value. In fact, the actual RER will normally differ from its equilibrium level, at least in the short run. However, other types of deviations can become persistent and can generate large RER *misalignments*.

At any time, the actual RER will depend on the values of the fundamentals (tariffs, international prices, real interest rates, and so on) and also on aggregate macroeconomic pressures, such as excess supply of money and the fiscal deficit. In this analysis, it is useful to distinguish between three different exchange rate regimes: (a) fixed nominal exchange rates (and variants, including managed and crawling rates); (b) floating rates; (c) and nonunified exchange rates, including dual rates and black markets for foreign exchange.

Predetermined Nominal Exchange Rates

A fundamental principle of open economy macroeconomics is that in order to have a sustainable macroeconomic equilibrium it is necessary for monetary and fiscal policies to be *consistent* with the chosen nominal exchange rate regime. This means that the selection of an exchange rate system imposes limitations on macropolicies. If this consistency is violated, severe disequilibrium, usually concentrated on RER misalignment, will follow.

The case of a large fiscal deficit under fixed nominal rates is the clearest example of inconsistencies between macroeconomic and exchange rate policies. In most developing countries fiscal imbalances are partially or wholly financed by money creation. If the required inflation tax is as high as the international rate of inflation, there will generally be an inconsistency between the fiscal deficit and the maintenance of a fixed nominal exchange rate. Since the domestic price of nontradables increases at a rate approximately equal to the rate of inflation, and the domestic price of tradables grows at approximately the rate of world inflation, a real appreciation will take place in every period.[7]

Monetary policy is another potential source of macroeconomic inconsistencies. Under predetermined nominal exchange rates, increases in domestic credit at rates exceeding the demand for domestic money will be translated into an excess demand for tradable goods, nontradable goods, and financial assets.[8] The excess demand for tradables will be reflected in a large trade deficit (or lower surplus), in a loss of international reserves, and in an increase in (net) foreign borrowing above its long-run sustainable level. The excess demand for nontradables will be translated into higher prices for those goods and consequently into an RER appreciation. If there are no changes in the fundamental real determinants of the equilibrium RER, this real appreciation will be a misalignment.

Consistency between monetary and exchange rate policies is needed not only under fixed rates, but also under systems such as passive crawling pegs. Argentina in the late 1970s exemplifies the problem. Its government used a preannounced rate of devaluation, or *tablita*, as a means to reduce inflation. However, the preannounced rate was clearly inconsistent with the inflation tax required to finance the fiscal deficit (Calvo 1986). This inconsistency generated not only a real appreciation but also substantial speculative bets on when the tablita would be abandoned.

Floating Nominal Exchange Rates

Under a floating system the nominal exchange rate fluctuates freely, responding to changes in macroeconomic policies. However, domestic prices and nominal exchange rates adjust to shocks at different speeds. A crucial difference between nominal exchange rates and the prices of goods is that the exchange rate behaves like an asset price; it is extremely sensitive to changes in expectations and to new information. In contrast, goods prices usually react much more slowly to shocks.

The existence of a floating system does not preclude the influence of monetary policies on real exchange rates. Monetary policies, however, do not affect equilibrium real exchange rates. These depend, under any nominal exchange rate regime, on real variables only. The wide swings in real exchange rates in the industrial countries in the past few years have become an important topic of analysis.[9]

The clearer case where monetaty policies induce changes of the actual RER has been analyzed by Dornbusch (1976). Assuming that asset (including foreign exchange) markets adjust instantaneously, while nontradable goods markets adjust only slowly, a monetary expansion will result in an immediate jump of the nominal exchange rate that will exceed the long-run equilibrium nominal deprecia-

tion.[10] Prices of nontradables, in contrast, will remain constant in the short run. As time passes, however, domestic prices will rise toward their new equilibrium level compatible with the increased stock of money, and the nominal exchange rate will fall toward its new equilibrium.[11]

Parallel Nominal Exchange Rates

Multiple exchange rates have traditionally had some appeal for the developing countries and have recently become fairly common. With this system different international transactions are subject to different nominal exchange rates, giving rise to the possibility of having more than one real exchange rate.[12]

With multiple exchange rates, the relation between macroeconomic policies and the rest of the economy will depend on the nature of the system. If, for example, the system consists of two (or more) *predetermined* (that is, fixed) nominal rates, it will work in almost the same way as under a single fixed rate. This is because multiple fixed rates are equivalent to a unified rate with taxes on certain external transactions.[13] In this case, as with unified predetermined rates, inconsistent macroeconomic policies will reduce international reserves, raise domestic inflation above world inflation, and result in RER overvaluation. Since this combination is unsustainable in the long run, the authorities will have to take corrective action.

A different kind of multiple rate system consists of a fixed official rate for current account transactions and an (official) freely fluctuating rate for capital account transactions. Although this arrangement has been more common in the industrial countries, some developing countries (such as Mexico and Venezuela) have recently experimented with it. The main purpose is to delink the real economy from the effects of supposedly unstable capital movements.[14] Portfolio decisions in this case are strongly influenced by the expected rate of devaluation of the free rate.[15]

Under this type of system, even if no current account transactions slip into the free rate, a change in the free nominal rate will influence the RER.[16] Suppose, for example, that domestic credit increases faster than the demand for domestic money, producing excess demand for goods and financial assets. As a result, international reserves will fall, the price of nontradable goods will rise, and the RER will appreciate. In addition, the demand for foreign assets will increase, which will result in a nominal devaluation of the free rate, and in changes in the domestic interest rate.[17] The devaluation of the free rate will have secondary effects on the official *real* exchange rate, through a wealth effect. But the essential point is that inconsistent macropolicies will eventually also be unsustainable, as interna-

tional reserves decline. By isolating the current from the capital account, all the dual rates system can do is delay the eventual crisis.

The analysis is more complex if some current account transactions are subject to the free exchange rate. In such a case, there will then be an additional RER—defined as the price of tradables subject to the free rate relative to nontradables—and changes in macropolicies will affect both real rates.[18] For example, an increase in domestic credit that exceeds growth of domestic money will now result in lower reserves, higher prices of nontradables, a higher "free" market nominal exchange rate, and increased foreign debt. The higher price of nontradables will generate an appreciation of the RER applicable to those goods subject to the official rate. For those goods subject to the free rate, what happens to the RER will depend on whether the nominal exchange rate determined in the free market increases by more or less than the price of nontradable goods. If its behavior is the same as under a freely floating rate, exchange rate overshooting is likely in this market: that is, the free rate will initially rise by more than the price of domestic goods. The RER applicable to this type of good will, at least in the short run, depreciate. Under this dual exchange rate system, it is thus perfectly possible for an expansionary monetary policy to produce a real appreciation for goods subject to the official market and a real depreciation for goods subject to the free market.

Perhaps the most complex type of regime consists of an official pegged (or predetermined) exchange rate plus an illegal black market for foreign exchange. Some kind of black market for foreign exchange exists whenever there are exchange controls; sometimes it becomes very significant, even dominant.[19] Although the results of a fixed official rate coexistent with a black market are similar to those of the dual rates regime discussed above, there are important differences.

- To the extent that the black market is illegal, the expectations and costs of detection affect the premium—the difference between the official and freely determined nominal exchange rates.
- Expectations of political events are crucial, since they reflect possible future changes in exchange controls and other policies.
- Exporters have to decide how much of their foreign exchange earnings to surrender legally and how much to handle through the black market.[20] This decision, of course, will partially depend on the size of the premium itself.

With a generalized black market for foreign exchange, the marginal rate for import and import-competing sectors will be the black market rate. As for exports, the marginal rate will depend on the institutional arrangement and on whether exporters "have" to surrender a specified proportion of their export proceeds through the

official market. If so, the marginal rate for exporters is a weighted average of the official and the black market rate. (If exporters have to surrender a given number of dollars, however, the black market rate is the marginal one.)

With a generalized illegal parallel market, an increase in the rate of domestic credit creation will boost domestic prices and the black market premium. Since in this situation it is likely that the central bank has no more international reserves to lose, this expansive monetary policy will push up the official RER, as well as lower the price of exports surrendered through the official market relative to those that use the parallel market.[21] As a result, a smaller proportion of export proceeds will be surrendered at the official rate, making the crisis even worse. Eventually, the inconsistent macropolicies will become unsustainable, and corrective measures will have to be taken. Then the issue of exchange rate *unification* becomes important, since the authorities will usually try to devalue the official rate, eliminating the multiple rates system.

Two Types of Real Exchange Rate Misalignment

For policy and analytical purposes it is useful to distinguish between two types of RER misalignment. The first, *macroeconomic-induced misalignment*, occurs when inconsistencies between macroeconomic (and especially monetary) policies and the official exchange rate system cause the actual RER to depart from its equilibrium value.[22] As the previous section pointed out, a monetary policy that is so expansive that it is incompatible with maintaining the predetermined nominal exchange rate will result in the price of domestic goods rising faster than world prices. As a result, the real exchange rate (EP_T^*/P_N) will appreciate. Not only will there then be pressures on the price of nontradables; international reserves will also decline, (net) foreign borrowing will rise above its long-run sustainable level, and black markets will grow.[23]

The second type, *structural misalignment*, takes place when changes in the real determinants (or fundamentals) of the equilibrium RER are not translated in the short run into actual changes of the RER. One example is a worsening in a country's international terms of trade; the equilibrium RER will change, since now a higher relative price of tradables will be required to maintain equilibrium in the economy.[24] If the actual RER does not change in line with the equilibrium RER, misalignment will take place. Temporary changes in fundamental variables can sometimes result in significant divergences between actual and equilibrium RERs (Edwards 1986d). Such disequilibriums can often be handled by, for example, running down (or building up) of international reserves, the use of the compensatory facilities of the

International Monetary Fund, and so on. However, it is essential to distinguish between changes that are genuinely temporary and those that are inclined to persist.

Correcting Misalignments

RER misalignments result in severe welfare and efficiency costs, the biggest of which come from the exchange and trade controls that usually accompany overvaluation. Such controls also encourage the creation of strong lobbies which compete for the rents generated by those controls (see Krueger 1974, Edwards 1987). And RER overvaluation greatly hurts exports; maintained for long periods, it can even wipe out the agricultural infrastructure (see World Bank 1984, Pfefferman 1985). RER misalignment also generates massive capital flight, which may be optimal from a purely private perspective, but a substantial cost in terms of social welfare (Cuddington 1986).

How should policymakers deal with RER misalignments? With macroeconomic-induced misalignment, a necessary step is to eliminate the inconsistency between macroeconomic policy and the nominal exchange rate. The authorities could then choose to wait for the economy to adjust on its own, until the actual RER converges with the equilibrium RER. However, this approach has various limitations—which can be particularly severe in the case of predetermined nominal exchange rates.

Once the inconsistent policies generating the macroeconomic-induced misalignment are controlled, the RER will still differ from the equilibrium RER. The question then is, How will the RER return to its equilibrium value? Consider the most common case, where the RER misalignment takes the form of real overvaluation and loss of international competitiveness. If nominal rates are fixed, a rapid return to RER equilibrium will then require a fall in the domestic prices of nontradables.[25] This is unlikely to happen quickly, so the RER misalignment will persist for a long period—as will all its related costs.

These costs will be supplemented when (as is usually the case) prices and wages are inflexible, for then unemployment will rise and output will be squeezed. The cut in aggregate expenditure resulting from the macroeconomic correction will generate an excess supply of (or smaller excess demand for) all types of goods and assets. For tradables, this will be reflected in a smaller trade deficit and reduced foreign indebtedness. In the nontradables market, however, the excess supply generated by the disinflation will require a drop in the relative price of nontradables to reestablish equilibrium. If prices are rigid, this realignment will not take place, and unemployment will result.

Devaluation

The restoration of RER equilibrium can be greatly aided by policies that help the domestic price of tradables to adjust. The most common of these policies is a devaluation of the nominal exchange rate.

In principle, the objectives of such devaluations are to improve both the international competitiveness of a country and its external position. Obviously, since RER $= EP_T^*/P_N$, a nominal devaluation that increases E will be effective in moving the RER toward its higher equilibrium value only if P_N does not go up in the same proportion as E.

In theory, and under the most common conditions, nominal devaluations will affect an economy through three main channels.[26] First, a devaluation has an *expenditure-reducing* effect. To the extent that domestic prices rise as a result of the devaluation, there will be a negative wealth effect that will reduce the real value of all assets (including domestic money) denominated in domestic currency. (Notice, however, that to the extent that there are assets denominated in foreign currency there may also be a positive wealth effect.) If the negative wealth effect dominates, expenditure on all goods (including tradables) will be reduced, as will be the trade deficit. Second, a nominal devaluation will tend to have an *expenditure-switching* effect.[27] To the extent that it succeeds in altering the relative price of tradables to nontradables, expenditure will switch away from tradables, and production toward them. While the expenditure-switching effect boosts demand for nontradables, the expenditure-reducing effect cuts demand for all goods. Depending on which of these effects dominate, the demand for domestic home goods will either rise or fall. Third, a devaluation will boost the domestic currency price of imported intermediate inputs, pushing up the supply schedules for the final goods (including nontradables).[28]

With unified nominal exchange rates and no quantitative restrictions, a nominal devaluation is not discriminatory: it increases the domestic price of *all* tradable goods, services, and assets. But if there is a parallel (or dual) market and only the official rate is devalued, then only those transactions affected by the official rate will be directly affected by the devaluation. However, transactions in the parallel market will be affected indirectly—though it is not possible to know in advance whether devaluing the official rate will increase or reduce the parallel market premium.[29]

When there are quantitative restrictions (QRS) on imports, devaluations will also fail to generate a uniform increase in the price of tradables (and other effects are also quite different; see Krueger

1983). The domestic price of importables is endogenous in the sense that it reaches whatever level is required for that market to clear. In this case a nominal devaluation will tend to have no direct (first-round) effect on the domestic price of such importables. However, since the prices of exportables continue to be tied, through the exchange rate, to world prices, the devaluation will increase their price relative to rationed importables. Nonrationed importables will also be affected by the devaluation: their price relative to both rationed importables and nontradables will tend to change.

If a country implements a devaluation at a time when the RER is greatly overvalued, the devaluation will generally help to restore equilibrium. And if devaluation is accompanied by the appropriate macropolicies, it will generally have a medium- to long-run positive effect on the RER. But if the initial condition is one of equilibrium—that is, the actual RER does not diverge from its long-run equilibrium level—a nominal devaluation will have no medium- or long-run effect. The price of nontradables, P_N, will quickly increase, and the RER will not be affected.

Since a nominal devaluation—which increases E in the RER formula (RER $= P^*E/P_N$)—tries to eliminate misalignment by causing a real depreciation, it is imperative that it is not accompanied by an equiproportional increase in P_N. Such an increase could come about in several ways: expansive credit (or monetary) policies, expansive fiscal policies, and wage indexation. But if the nominal devaluation is implemented along with monetary and fiscal restraint and without wage indexation, it is likely to achieve a real devaluation and to help the RER return to equilibrium.

Even if the accompanying macropolicies are restrictive, however, nominal devaluations will never result in *equiproportional* real devaluations in the medium to long run. Several forces will ensure some offsetting increase in the price level P_N. For example, nominal devaluation will boost the prices of imported inputs and consequently the cost of producing domestic goods. Over time, such effects will grow. Thus the nominal devaluation will, on impact, result in a large (and almost equiproportional) increase in the RER. Then, as the prices of imported goods (and in some cases wages) react to the nominal devaluation, the effect on the RER will be *partially* eroded. (See the final section for empirical results regarding the degree of erosion.)

Alternatives to Devaluation

In principle, other policies can have effects similar to those of a devaluation, though it is not easy to replicate all the results of devaluations.

IMPORT TARIFFS AND EXPORT SUBSIDIES. This combination will replicate only some of the effects of a devaluation. Import tariffs will boost the domestic price of importables; export subsidies will likewise boost the domestic price of exportables. As long as both tariffs and subsidies are of the same rate, the relative price between importables and exportables (the tradables) will not be affected, but their relative price with respect to nontradables will increase. This is the same consequence that results from a successful devaluation.

In other respects, however, the two policies differ quite sharply. First, a devaluation affects both visible and invisible trade; the policy of tariffs with subsidies affects only visible trade. Second, a devaluation affects the domestic currency price both of tradable goods and services and of tradable assets; tariffs with subsidies affect only the domestic price of tradable goods and services. Third, a devaluation will affect domestic interest rates if it breeds expectations of further devaluations. In this case, some fraction of the expected devaluation will be passed on to the domestic interest rate, even if the capital account is partially closed. By contrast, the tariffs with subsidies will not have such an effect on interest rates. Fourth, devaluations will generally have no direct effects on the fiscal budget; the tariffs with subsidies will generally result in fiscal imbalances. Fifth, the imposition of tariffs and export subsidies will prompt various interest groups to claim exemption for their particular industry—and history shows that they often succeed. This political reaction is avoided with a devaluation.

MULTIPLE NOMINAL EXCHANGE RATES. The adoption of multiple rates constitutes a semidevaluation, inasmuch as the exchange rate applied to some transactions is altered. Thus multiple rates are essentially discriminatory, whereas one of the most important properties of a devaluation (without rationing) is its neutrality. Furthermore, every variety of multiple rates system begs the important question of how (and at what level) to unify the different rates eventually.

INCOMES POLICIES. This approach will succeed in realigning the real rate only if the price of domestic goods falls relative to that of foreign goods. On this rule, the historical evidence is emphatic: incomes policies that are not supplemented by demand restraint have invariably failed to bring down inflation for more than a short period. Trying to realign the real exchange rate by controlling incomes policies alone is not only an inefficient approach; it is also very risky.

The Effectiveness of Devaluations: The Evidence

Empirical evidence strongly suggests that, if accompanied by appropriate macroeconomic policies, nominal devaluations can produce a real depreciation and improve a country's external position. In his classic study, Cooper (1971) analyzed twenty-four episodes and found that most nominal devaluations were indeed associated with real devaluations. He also pointed out that most major discrete devaluations were accompanied by some sort of trade reforms—quantitative restrictions lifted, tariffs lowered. This finding has also been reported by Krueger (1978) and Edwards (forthcoming).

Conolly and Taylor (1976, 1979) found that nominal devaluations were translated into real devaluations in the short to medium run. Their 1979 paper suggests that, on impact, nominal devaluations have

Table 1. ***Index of Effectiveness of Nominal Devaluation***

Country	*Year*	*Quarter of devaluation*	*1 quarter after*	*4 quarters after*	*8 quarters after*	*12 quarters after*
Bolivia	1972	0.68	0.66	0.36	0.09	0.03
	1979	0.51	<0	<0	<0	*
Colombia	1962	0.94	0.48	<0	<0	<0
	1965	1.00	0.88	0.50	0.57*	0.66*
Costa Rica	1974	0.82	1.04	0.75	0.75	0.83
Cyprus	1967	1.00	0.19	0.27	0.31	0.32
Ecuador	1961	1.05	1.06	0.93	0.51	0.03
	1970	0.88	0.74	0.73	0.59	0.66
Egypt	1962	1.03	1.03	0.98	0.85	0.32
	1979	0.99	1.05	0.98	0.93	0.76
Guyana	1967	1.03	0.96	1.10	1.31	1.42
India	1966	0.92	0.81	0.56	0.56	0.62
Indonesia	1978	1.00	0.98	0.73	0.64	0.61
Israel	1962	0.94	0.87	0.74	0.63	0.53
	1967	0.95	0.93	0.99	1.05	0.57
	1971	0.98	0.64	0.53	0.23	<0
Jamaica	1967	0.96	0.99	0.83	0.57	0.37
	1978	0.46	0.43	0.31	0.26	0.20
Malta	1967	0.93	0.88	0.99	1.12	0.99
Nicaragua	1979	0.17	<0	<0	<0	<0
Pakistan	1972	1.00	0.99	0.78	0.61	0.45
Peru	1967	0.89	0.65	0.40	0.41	0.36
Philippines	1962	0.97	0.89	0.87	0.73	0.69
	1970	0.72	0.65	0.49	0.47	0.55
Sri Lanka	1967	0.82	0.71	0.54	0.70	0.69
Trinidad	1967	0.82	0.71	0.54	0.70	0.69
Venezuela	1964	0.98	0.95	0.96	1.00	1.02
Yugoslavia	1965	0.67	0.46	0.42	0.29	0.26

Note: This index is the percentage change in the real exchange rate between one quarter before the devaluation and the quarter given, divided by the percentage change in the nominal exchange rate during the same period. An asterisk indicates that a new devaluation took place.

an important positive effect on relative prices, but this effect erodes slowly—until, nine quarters after the devaluation, the RER is back to the value it had two years before devaluation. Although the details differ, the same point is established in studies by Donovan (1981), Bautista (1981), and Morgan and Davis (1982).

More recently, Edwards (1986b) analyzed twenty-nine devaluations between 1962 and 1979. He found that in some countries nominal devaluation had succeeded in producing a sizable real devaluation. Table 1 shows an index of effectiveness of real devaluations for twenty-eight of these episodes. This index is constructed as the ratio of the percentage change in the RER to the percentage change in the nominal exchange rate. As the table shows, the initial effects of devaluations are large. After twelve quarters, however, much or all of the benefits have been eroded. Indeed the RER became even *more overvalued* in the cases of Bolivia (1979), Cyprus, Egypt (1962), Israel (1971), Jamaica (1967), and Nicaragua (1979). Edwards (1986b) showed that countries that had a large (or complete) erosion of the effect of the nominal devaluation were those that accompanied the exchange rate adjustment with expansive credit policies, large fiscal deficits, or wage indexation. Those countries that experienced only minor erosion usually implemented consistent macroeconomic restraint. Regression results in Edwards (1986b) indicate that, on average and all other things given, a nominal devaluation of 10 percent will result, in the first year, in a real devaluation of approximately 7 percent. However, the real effect of the nominal devaluation erodes (rather slowly) through time. After three years, the average effect on the real exchange rate of a 10 percent nominal devaluation will be only around 5 percent.

The most interesting finding in these regressions concerns the effect of changes in domestic credit creation. The results show that if a devaluation is accompanied by expansive credit policies, its corrective effect on the RER will be greatly diminished. If a nominal devaluation of 10 percent is accompanied by an acceleration of the rate of growth of domestic credit equal to ten percentage points, the resulting depreciation in the RER will be reduced to only 2 percent in that year. After two years, the RER will again have become overvalued.

Summary and Conclusions

Exchange rate misalignment has been a serious problem for developing countries in recent years. In looking at these problems the distinction between nominal and real exchange rates is crucial. Misaligned real rates have usually resulted from macroceconomic policies that have not been consistent with the exchange rate system, or from external shocks. These misalignments misrepresented the rela-

tive costs of production and consumption of tradable and nontradables. Stability of nominal exchange rates has not always implied stability of real exchange rates, and nominal (and real) exchange rates have not always moved smoothly to new equilibriums after disturbances. Trade barriers and multiple exchange rates, which have often been introduced in response to economic shocks, are not efficient instruments to adjust real exchange rates. Inappropriate monetary policies have often prevented nominal exchange rate adjustments from turning into real exchange rate changes.

Experience suggests, however, that exchange rate misalignment is susceptible to solution. A nominal devaluation undertaken with appropriate fiscal and monetary policies can generate a real depreciation and increase a country's ability to sell those goods in which it is internationally competitive and to attract the investment needed for growth.

Abstract

This article analyzes the theory of equilibrium real exchange rates and defines misalignment as a deviation of the real exchange rate (RER) from its equilibrium level. The role of macroeconomic policies is then analyzed under three alternative nominal exchange rate regimes: predetermined nominal exchange rates, floating nominal rates, and dual or black market nominal exchange rates. This discussion points out how inconsistent macroeconomic policies often lead to real exchange rate misalignment. Corrective measures, including nominal devaluations and several alternative approaches, are then evaluated.

Notes

This article is a considerably shortened and revised version of chapters 1 and 2 of my book, *Exchange Rate Misalignment in Developing Countries*, which was published in November 1988 by Johns Hopkins University Press for the World Bank. Both the article and book originated in a project on exchange rate policy in developing countries undertaken by the Country Policy Department of the World Bank in 1985–86. Armeane Choksi provided strong support for that project. Marcelo Selowsky read every draft of this paper and was relentless with his comments. Comments by Edgardo Barandiaran, Kathy Krumm, Alejandra Cox-Edwards, Farruq Iqbal, Miguel Savastano, Giacomo Luciani, Ruben Lamdany, and Alan Walters are gratefully acknowledged.

1. Although this definition is the most common one, there is still some confusion on what exactly people mean by "the" real exchange rate. See Edwards 1988 and Edwards, forthcoming, on this subject.

2. In theory there are better indexes of a country's international degree of competitiveness, such as unit labor costs. Unfortunately, these indexes are unreliable in the case of the developing countries.

3. Implicit in this definition is the requirement that there are no deviations from the natural rate of unemployment. In fact, internal equilibrium—defined as a nontradables market that clears—can take place at different levels of employment. In our definition of equilibrium RER it is implicit that this equilibrium takes place with no unemployment above its natural level.

4. This intertemporal budget constraint can be written in the following way:

$$\Sigma_1(l + r)^{-i}C_{t+i} = 0$$

and states that this country cannot be a net lender or net borrower forever. Eventually it has to pay its debts. For a formal and technical discussion on the equilibrium real exchange rate see Edwards 1986d, where an intertemporal general equilibrium model is defined. See also the discussion in Williamson 1983.

5. Naturally not only these variables affect the equilibrium RER, but in many cases the relation will go both ways, with changes in the RER also affecting some of the fundamentals. Perhaps the clearest example of this two-way relation has to do with RER movements and tariffs. It is usually the case that real exchange rate overvaluation is met by an increase in exchange controls and tariffs.

6. These "plausible conditions" are that the substitution effect dominates the income effect, and that all goods are gross substitutes in consumption. See Edwards 1986d. Notice that since a tariff affects the relative price of importables to exportables, it is useful to concentrate on both the relative prices of exportables and importables. Depending on the relative weights of importables and exportables in the price index for tradables, the equilibrium RER will appreciate or depreciate as a consequence of the imposition of an import tariff. What is clear, however, is that the relative price of importables has gone up relative to both nontradables and exportables, while the relative price of exportables will fall relative to the other two goods.

7. The domestic price of tradables is equal to $P_T = EP_T^* \tau$, where P_T^* is the international price of tradables, E is the nominal exchange rate, and τ is one plus the tax on tradables. If the exchange rate is fixed and there are no changes in τ, P_T will increase at approximately the rate of world inflation.

8. Notice that here we are considering monetary policy as different from the fiscal problem discussed above. In reality, however, both of these problems can be considered to be related. This is because in the vast majority of the developing countries government deficits are financed by money creation.

9. See Williamson 1983 for a meticulous analysis of the possibilities of RER misalignment under floating rates.

10. The overshooting in the nominal rate is required in order for interest arbitrage to hold permanently. See Dornbusch 1976.

11. Notice that the direction of the departure of RER from its equilibrium level is the opposite of that under fixed rates.

12. There is a growing theoretical literature on the effects of macroeconomic policies under nonunified nominal rates. See Aizenman 1985 and Dornbusch 1986a and 1986b.

13. See, for example, the discussion in Dornbusch 1986b.

14. In fact, this type of dual rate system is an alternative to foreign exchange controls.

15. The free rate, in turn, will be highly responsive to expectations about future events. This type of regime has been recently discussed by Dornbusch (1986a).

16. Notice that if no current account transactions are subject to the free rate the relevant RER—that is, the appropriate measure of competitiveness—is the fixed rate RER. This is because this is the one at which all goods transactions can take place.

17. In this case, if there are no capital controls and we assume risk neutrality, the following relation will hold between domestic (i) and foreign (i^*) interest rates: $i = (e/f)\, i^* + (\dot{f}/f)$ where e is the fixed nominal exchange rate, f is the free rate, and $(\dot{f}/f)$ is the expected change in f.

18. Dornbusch 1986b analyzes this case in some detail.

19. The extent and importance of the black market is basically determined by whether authorities allow some changes in international reserves. Under complete rationing the authorities have no reserves, and legal export proceeds are the only source of foreign exchange.

20. In a way exporters also face this decision under an official dual system. In that case it will still pay to convert export proceedings at the higher free rate.

21. Depending on expectations the nominal exchange rate determined in the parallel market can increase by more or by less than domestic prices.

22. In a predetermined nominal system this influence of monetary policies is reflected in changes in the price of nontradables; under fluctuating rates it is reflected in changes in both the nominal rate and the price of domestic goods.

23. Naturally, as the gap between the official and parallel market widens, so do the distortions associated with these dual rates.

24. Strictly speaking, as a result of a worsening in the international terms of trade the equilibrium RER could either appreciate or depreciate. As discussed above, under the most plausible circumstances, however, it will depreciate.

25. Since RER $= EP_T^*/P_N$ under fixed E, RER can only jump back to equilibrium if P_N declines.

26. In some cases, however, if there are extensive quantitative import controls and parallel markets some of this effects will be different. See the discussion below.

27. We say it will "tend to have" because this assumes that the nominal devaluation is translated into a real devaluation.

28. The combination of these effects may very well result in a *decline* of aggregate output as a consequence of the devaluation. See Edwards 1986a.

29. Of course, the devaluation itself will affect the parallel rate. Theoretically, an official devaluation can generate either an increase or decline in the black market premium. The empirical evidence indicates that following the nominal devaluation there is usually a drop in the parallel market premium. An important question when there are parallel markets refers to exchange rate unification. Lizondo 1986 has shown that the equilibrium nominal rate can be either above or below the black market rate.

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